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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

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☐ Additional inventors are being named on the _____ separately numbered sheets attached hereto

TITLE OF THE INVENTION (500 characters max)

Illumination System

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ENCLOSED APPLICATION PARTS (check all that apply)

☑ Specification Number of Pages 4
☐ Drawing(s) Number of Sheets
☐ Application Data Sheet. See 37 CFR 1.76
☐ CD(s), Number
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METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT

☑ Applicant claims small entity status. See 37 CFR 1.27.
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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☑ No.
☐ Yes, the name of the U.S. Government agency and the Government contract number are: _____

Respectfully submitted,

SIGNATURE _____ Date 7/30/03

TYPED or PRINTED NAME James R. Zarian REGISTRATION NO. (if appropriate)

TELEPHONE 714-540-5700 Docket Number:

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Provisional Application, Assistant Commissioner for Patents, Washington, D.C. 20231.

Background

Various forms of linear light forms depicting neon have recently been introduced. Some of these include products from Lumenyte, Fiberstars and Supervision. These light forms and systems are primarily used in signage, displays, architectural, transportation and other consumer applications.

Other variation of the same modality are light guides, fiber optics or light conduits that have also been introduced for medical, industrial, communication and other applications.

Linear light forms have been the center of attention, because of aesthetic, flexibility, color changing, safety among other attributes, that together advantageously serve the intended markets. The types and functionality of these linear light forms, light guides, light conduits and fiber optics and related systems can be expanded by the present invention.

Invention

Invariably in all of light forms such as fiber optics, light guides, light pipes and light conduits or similar modalities – which, for the purposes of this invention would be considered as light forms – are mainly composed of a core and a cladding. The core is the light transmitting medium and the cladding is the immediate layer in contact with the light- transmitting medium that in combination provide total internal reflection useful in light forms. Further, the core has a higher refractive index and the cladding has a lower refractive index. In all of the light forms the cladding molecular structure contains fluorine atoms. Fluorinated or fluorine based molecular structures inherently provide a relatively lower refractive index. Fluorinated polymers with backbones other than carbon, such as silicone have also been used. Flourinated and fluorine containing polymers are invariably expensive and hard to process.

It has been discovered according to the present invention that by appropriate selection of core / clad combinations, the clad materials can be free of fluorine atoms.

Or conversely, the immediate material in contact with the light-transmitting medium is free of fluorine atoms. Such materials are less expensive, easier to apply and more environmental friendly.

Further, it has been discovered that higher refractive index materials can advantageously be used as cladding material. The main objective of this invention is to make light forms that glow from the side. Another objective is to have light forms that provide an aura like neon lighting.

For example, in one of the commercially available linear light forms such as marketed by Lumenyte Int. Corp., a flouropolymer resin such as FEP (fluorinated ethylene propylene compolymer) is extruded into a tube, next the FEP tubing is expanded to provide a heatshrink tubing, a monomer mixture is placed in the heatshrink tubing and polymerized to produce a light form, next the heatshrink tubing is shrunk to create an "even look". Such a linear light form when lit using a light source glows like neon lighting. However, FEP is relatively expensive and has a very high specific gravity (e.g. 2.2) and is used in a very low wall thickness, which necessitates the use of a jacketing. To be fair the jacketing has at times been used to create other effects such as creating an aura...

In the present invention, when a fluorine free polyurethane tubing was filled with a light transmitting core material such as a polyglycol P2000 provided by Dow Chemicals, Midland, Michigan as the light transmitting medium, the resulting embodiment of the present invention not only glowed brighter than the above example, but additionally exhibited a more pronounced aura, a desirable quality[1]. One of the advantages of the present invention is that a tubing of polyurethane alone, which is fabricated by conventional extrusion processes, provides the container or cladding in comparison to the many layers and steps undertaken by a system such as Lumenyte's light form disclosed above.

Similarly, a series of samples were prepared as follows:

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[1] Both samples were energized using red Kingbright light emitting diodes placed at each end. The samples were each 6 feet long.

Sample	Cladding	Date Sample Prepared	Core	Length, ft	LED	Result
1	THV / McMaster 1/4"x 5/16"	07/03/03	Dow Polygylcol P425	4	Red Kingbright	Observed some drop off in the middle, 2' of this batch more even
2	SMC TU0604 POLYURETHANE 8x5 mm B.JF	07/01/03	Dow Polygylcol P425	4	Red Kingbright	Better results compared to Sample # 1
3	TYGON MPF-100 3/16" x 5/16"	07/03/03	Dow Polygylcol P425	3	Red Kingbright	Cladding cloudy to begin with and as expected tremendous loss of brightness after the first 18"
4	SMC TU0604 POLYURETHANE 6x4 mm B.JF	07/01/03	Dow Polygylcol P425	2	ETG - RGB	Drop off very noticeable if only one LED, with two LED's the result very satisfactory
5	THV McMaster 1/8" x 1/4"	07/03/03	Dow Polygylcol P425	4	Red Kingbright	Comparable to 7, although slightly larger in diameter
6	SMC TU0604 POLYURETHANE 6x4 mm B.JF	07/01/03	Dow Polygylcol P425	2	Red Kingbright	Relatively even, even with one LED, can definitely be used for short runs
7	SMC TU0604 POLYURETHANE 6x4 mm B.JF	07/01/03	Dow Polygylcol P425	4	Red Kingbright	Comparable to 5, although slightly smaller in diameter
8	TYGON 2275 1/4" x 3/8"	07/03/03	Dow Polygylcol P425	3	Red Kingbright	Very bright compared to 1 & 2, similar to 9, the wall is thicker and length shorter
9	TYGON 2075 1/4" x 3/8"	07/03/03	Dow Polygylcol P425	3	Red Kingbright	Very bright compared to 1 & 2, similar to 8, the wall is thicker and length shorter
10	ARK-PLAS AP01T181PSNA PU	06/30/03	Dow Polygylcol P425	6	Red Kingbright	Developed an air gap, not sure of the cause, relatively even for 6'

The results indicate that polyurethane is adequate, the purity of the Dow Polyglycol is not known.

Materials in the table above are as follows:

THV is fluorinated terpolymer such as THV 500 series manufactured by Dyneon, Oakdale, Minnesota and obtained in tubing form from McMaster of Chicago, Illinois.

Polyglycol P425 is polypropyleneglycol obtained from Dow Chemical, Midland, Michigan.

LEDs are hyper-red L7113SEC/H obtained from Kingbright, Walnut, California

Polyurethane TU0604 B.JF obtained from SMAC, Carlsbad, California

Tygon MP F-100, 2275 and 2275 obtained from Saint-Gobain, Akron, Ohio

ARK-PLAS AP01T18PSNA polyurethane obtained from Arkansas Plastics, Arkansas

Polyurethane samples exhibited a pronounced aura and were very satisfactory. The refractive indices of polyurethanes are in the 1.5-1.6 range according to Polymer Handbook, John Weilly Publishers, New York, New York. The refractive index of Polyglycol P425 is reported as approx. 1.43 by Dow Chemicals, Midland Michigan. A combination of polyglycols as a light transmitting medium and polyurethanes as cladding satisfy the present invention, that is the refractive index of the cladding is higher than the light transmitting medium and polyurethanes as used in the examples above do not contain any fluorine atoms in the molecular structure.

I claim the invention as explained and disclosed above.

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